# **Original Research Article**

DOI: http://dx.doi.org/10.18203/issn.2454-5929.ijohns 20173135

# Clinicopathological study of tumours of maxilla

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**Received:** 15 June 2017 **Accepted:** 01 July 2017

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#### **ABSTRACT**

**Background:** Malignant neoplasms of the nose and paranasal sinuses are rare and account for 3% of malignancies involving head and neck region. Maxillary sinus is the commonest area affected and squamous cell carcinoma is the commonest malignancy reported. Due to nonspecific clinical features, late presentations and poor accessibility tumours in these areas are both therapeutically and diagnostically challenging. Data about maxillary sinus tumours, especially from Karaikal are lacking. This prospective hospital-based study was conducted to determine the common benign and malignant tumours affecting the maxilla, their epidemiology and to analyse their clinical presentations.

**Methods:** Relevant epidemiological and clinical details were collected for all the patients with maxillary tumours and thorough clinical evaluation was performed. CT scan of head and neck region and histopathological examination of the lesion was carried out. All the details were tabulated and percentages were calculated for comparison and analysis. **Results:** During two years period of the study 44 patients with tumours affecting the maxilla were detected, 32 (73%) being benign and 12 (27%) malignant. Incidence of both benign and malignant tumours was highest in the 51-60 years age group with male preponderance. Squamous cell carcinoma (58.33%) was the most common malignant histological variant found while inverted papilloma with squamous epithelium (62.5%) was the most common benign histological variant. In TNM staging, 42% patients had T4 and the remaining were T3 and T2.

**Conclusions:** In Karaikal region, inverted papilloma with squamous epithelial lining and squamous cell carcinoma are the commonest benign and malignant tumours of maxilla respectively. Although clinical manifestations of both benign and malignant lesions overlap, certain features like facial pain, cheek swelling, loosening of teeth which were found only in association with carcinoma should warrant thorough evaluation.

Keywords: Paranasal sinus tumours, Inverted papilloma, Squamous cell carcinoma of maxillary sinus

## INTRODUCTION

Malignant neoplasms of the nose and paranasal sinuses are rare. They account for 1% of all human malignancies and 3% of those involving head and neck region. Around 80% of the malignancies occurring in paranasal sinuses originate from the maxillary sinus and 80% of them are squamous cell carcinomas. Among the squamous cell carcinomas affecting nose and paranasal sinuses 60-70% affect maxillary sinus, 12-25% affect

nasal cavity, 10-15% affect ethmoid and 1% affect sphenoid/frontal sinuses.<sup>4</sup>

Tumours of paranasal sinuses, even when they are malignant, are known to be detected in the late stages when they become large enough to cause symptoms.<sup>2,3</sup> Poor accessibility of the paranasal mucosa for routine examination is another reason for delay in detection. This often leads to wrongly treating the patients for chronic inflammatory rhinosinal disease such as chronic sinusitis,

nasal polyp, lacrimal duct obstruction, or even cranial arteritis.<sup>2,3</sup>

This study was conducted to determine the common benign and malignant tumours affecting the maxilla, their epidemiology and to analyse their clinical presentations. Due to low incidence of maxillary sinus neoplasms, especially the malignancies, cumulative data about them from a single institution are scarce. Therefore, studies analysing maxillary sinus tumours, such as this one, will contribute in understanding their pathogenesis, clinical behaviour and also allow comparative analysis with other relevant studies.

#### **METHODS**

This was a hospital based case series study conducted after obtaining institutional ethics committee approval. All the patients with maxillary tumours attending Vinayaka Mission's Medical College Hospital, Karaikal from June 2009 to June 2011 were included in the study. Relevant epidemiological data and clinical history was collected. Thorough clinical evaluation of head and neck region including ear-nose-throat, ocular, intra-oral examination and neck examination for palpable lymph nodes was done. Diagnostic nasal endoscopy and radiological study including CT scan were done to assess location, size, extend and possible invasion of the tumours. A biopsy was taken from mass or ulcerative lesion from all the cases and histopathological examination was done. The data obtained was tabulated in Microsoft excel and percentages were calculated for comparison.

#### **RESULTS**

During two years period of the study 44 patients with tumours affecting the maxilla were detected, 32 (73%) being benign and 12 (27%) malignant. Incidence of both benign and malignant tumours was highest in the 51-60

years age group (Table 1). Men were more commonly affected by both benign and malignant tumours (Table 2). Nearly half of the patients with malignant tumours had symptoms ranging for 1 to 3 months and those with benign ranging 4-6 months (Table 3). Presenting complaints of the patients are enlisted in Table 4. Patients with malignant tumours had nasal mass as the most common sign in 83.33% of patients while nasal obstruction was a common symptom with 66.67% of patients. Among the malignant tumours, squamous cell carcinoma (58.33%) was the most common histological variant found while neuro endocrine tumour. Mocoepidermoid carcinoma and transitional cell carcinoma were the least found with an incidence of 8.33% each (Table 5). Among the benign tumours inverted papilloma (IP) with squamous epithelium (62.5%) was the most common histological variant found while inverted papilloma with oncocyte was the least common with an incidence of 3.12% (Table 5). The TNM staging of the malignant tumours is tabulated in Table 6.

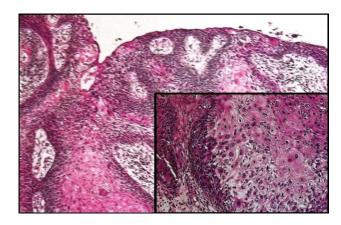


Figure 1: Low power view of sinonasal squamous cell carcinoma showing cellular atypia, loss of polarity with stromal invasion. Inset - high power view of sinonasal squamous cell carcinoma showing atypical mitosis and nuclear atypia.

Table 1: Age-wise incidence of maxillary tumours.

	Malignant tumours (n=12)		Benign tumours (n=32)	
Age in years	Number of cases	Percentage (%)	Number of cases	Percentage (%)
< 20	0	0	0	0
21 – 30	0	0	1	3.12
31 – 40	2	16.67	5	15.62
41 – 50	2	16.67	8	25
51 – 60	4	33.33	13	40.62
61 – 70	2	16.67	5	15.62
71 - 80	2	16.67	0	0

Table 2: Gender-wise incidence of maxillary tumours.

	Malignant tumours (n=12)		Benign tumours (n=3	2)
Sex of patient	Number of cases	Percentage (%)	Number of cases	Percentage (%)
Male	8	66.67	22	68.75
Female	4	33.33	10	31.25

Table 3: Duration of complaints prior to the otorhinological consultation.

Malignant tumours (n=	:12)		Benign tumours (n=32)		
Duration of complaints	Number of cases	Percentage (%)	Duration of complaints	Number of cases	Percentage (%)
1 – 29 days	0	0	1-3 months	2	6.25
1-3 months	6	50	4 – 6 months	17	53.12
4 – 6 months	4	33.33	7 - 9 months	11	34.37
7 – 12 months	1	8.33	10 –12 Months	1	3.12
$1 - 1\frac{1}{2}$ years	1	8.33	1-5 years	1	3.12

Table 4: Clinical manifestations of maxillary tumours.

Crymptoms and signs	Malignant tumours (n=12)		Benign tumours (n=32)	
Symptoms and signs	Number of cases	Percentage (%)	Number of cases	Percentage (%)
Cheek swelling	7	58.33	0	0
Nasal obstruction	8	66.67	31	96.87
Loosening of tooth	5	41.67	0	0
Epistaxis	4	33.33	32	100
Facial pain or	4	33.33	0	0
Head ache	2	16.67	31	96.87
Nasal mass	10	83.33	32	100
Neck nodes	2	16.67	0	0
Ulcer over hard plate	3	25%	0	0
Proptosis	0	0%	0	0

Table 5: Histological classification of maxillary tumours.

Histological classification	Number of cases	Percentage (%)
Malignant tumours	(n=12)	
1. Squamous cell carcinoma	7	58.33
A – Well differentiated	3	25
B – Moderately differentiated	2	16.67
C – Poorly differentiated	1	8.33
D – Undifferentiated/anaplastic	1	8.33
2. Adeno carcinoma	2	16.67
3. Neuro-endocrine tumor	1	8.33
4. Mocoepidermoid carcinoma	1	8.33
5. Transitional cell carcinoma	1	8.33
Total	12	
Beningn tumours – Inverted papilloma	(n=32)	
1. Squamous epithelium	20	62.50
A. With cytologic atypia	8	25
B. No cytologic atypia	12	37.50
2. Squamous epithelium + columnar epithelium + secretory cells,	2	6.25
cytologic atypia		
3. Squamous epithelium + columnar epithelium + secretory cells, no	4	12.50
cytologic atypia		
4. Columnar epithelium, no cytologic atypia	4	12.50
5. Oncocyte, no cytologic atypia	1	3.12
6. Spindle cells arranged in storiform pattern around the blood vessels		
No necrosis/cellular atypia/mitosis haemangiopericytoma like tumour	1	3.12
Total	32	·

TNM classification	Number of cases	Percentage (%)
T1	0	0
T2	3	25
T3	4	33.33
T4a	5	41.67
T4b	0	0
N0	10	83.33
N1	1	8.33
N2a	1	8.33
N2b	0	0
N2c	0	0
N3	0	0
Mo	0	0

Table 6: TNM Classification of malignant tumours of maxilla.

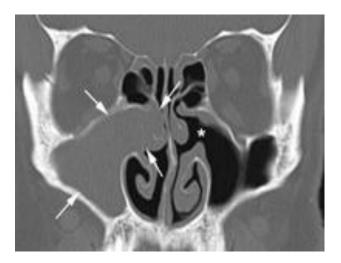


Figure 2: Inverted papilloma of right maxillary sinus. Soft tissue lesion in the right maxillary sinus with destruction of the medial wall and extending into the right nasal cavity and destruction of floor of the orbit (arrows indicate bone destruction).



Figure 3: Squamous cell carcinoma of right maxillary sinus. Soft tissue lesion in right maxillary sinus with destruction of medial wall of sinus extending into right nasal cavity and ethmoidal sinuses.

#### **DISCUSSION**

Both benign and malignant neoplasms can affect Maxilla. In this study benign tumours of maxilla (32, 73%) were found to be 2.6 times commoner than malignant ones (12, 27%). Though squamous cell carcinomas are the commonest histological type of malignancy affecting sinuses, others including sarcoma, adenoid cystic carcinoma, lymphoma, melanoma, and olfactory neuroblastoma may also occur. 6,7 Other studies have reported sinonasal malignancies to be two to three times more common in males than females and those aged 50-70 years are more commonly affected. 4,8-10 In this study the highest incidence of both benign (41%) and malignant (33%) tumours was found in the 50-60 years age group. While no benign tumours were detected in <20 years, no malignant tumours were detected in <30 years age. Both benign and malignant tumours were around two times commoner in men than women in the present study too.

# Inverted papilloma (Schneiderian papilloma, inverted type)

In this study all the benign tumours detected were inverted papillomas (IP). IP is derived from the Schneiderian membrane in which the epithelium invaginates into and proliferates in the underlying stroma. It is reported to be two to five times more common in males and in the 40-70 years age group. It represents around 0.4-4.7% of all sinonasal tumours. There is no proven association of IP with inflammation, allergy, smoking, noxious environmental agents or occupation. IP Scharacteristically arise from the lateral nasal wall in the region of the middle turbinate or ethmoid recesses, and often extend secondarily into the sinuses, especially the maxillary and ethmoid.

Nasal mass, nasal obstruction, headache and epistaxis were the commonest presenting features of IP in the study group. Other similar studies also have shown nasal obstruction as the most common presenting symptom and the other symptoms include nasal discharge, epistaxis, anosmia, headache, epiphora, proptosis and diplopia. Pain

is an uncommon initial complaint, occurring in only about 10% of all cases. When present, it should always arouse suspicion of secondary infection or malignant change. Though headache was a common symptom facial pain was not seen in those with IP in this study.

Most of the inverted papillomas (63%) were lined by squamous epithelium and columnar epithelium (12.5%), followed by the other types (Table 5). Inverted papillomas are composed mostly of hyperplastic ribbons of basement membrane-enclosed epithelium that grow endophytically into the underlying stroma. The epithelium is multilayered, and formed of nonkeratinizing squamous or ciliated columnar (respiratory epithelial) cells admixed with mucocytes, occasionally other types. Several epithelial types may be present in the same lesion, though their proportions may vary in different lesions or even in different areas of the same papilloma. It is uncommon to see mitoses and are seen primarily in the basal and parabasal epithelium, even when present. Focal surface keratinisation (20%) and dysplasia (5-10%) may be seen. 15 These are not necessarily signs of malignancy, but they should alert the pathologist of the need of thorough evaluation of the papilloma. In the present study 31% of IPs showed atypia in histology which included 40% of IPs lined by squamous epithelium.

IPs are occasionally complicated by carcinomas, especially squamous cell carcinoma in 2-27%. <sup>15</sup> As expression of CD44s is reduced/absent in papillomas associated with carcinomatous change, it can be used as a marker in identifying a malignant component. <sup>16</sup> There is no correlation between the number of local recurrences of an inverted papilloma and the subsequent development of carcinoma. There is some evidence, however, to suggest that HPV 16 and 18 may be more carcinogenic than HPV 6 and 11. <sup>17</sup>

Though histologically benign, they have an unlimited growth potential and, if neglected, can cause considerable morbidity or even death by extending into contiguous structures (Figure 2). Attempts to remove these lesions intranasally by snare and avulsion have resulted in 'recurrence' (or persistence) in around 60% patients. 18 Except for selected small lesions which can be removed by endoscopic sinonasal surgery, lateral rhinotomy and medial maxillectomy with meticulous removal of all mucosa in the ipsilateral paranasal sinuses is the treatment of choice, which reduces the recurrence rate to <20%. 18 Recurrences typically appear within 2-3 years of therapy but may be delayed for many years. There is no clear correlation between the histological type and risk of recurrence. 13,18 Even those with prominent mitotic activity and dysplasia do not invariably show an increased recurrence or malignancy. Nevertheless, dysplasia, especially if moderate to severe, demands thorough microscopic evaluation of all resected tissue to avoid overlooking small foci of carcinoma.<sup>1</sup>

#### Maxillary sinus squamous cell carcinoma (MSCa)

Nasal obstruction and nasal mass were the commonest manifestations of maxillary carcinoma similar to that of IP. Cheek swelling (58%), facial pain (33%), loosening of teeth (42%) and neck nodes (17%) were exclusively found in those with maxillary carcinoma and not with benign lesions (Table 4). Around 83% of patients with carcinoma and around 60% of those with IP presented to ENT surgeon within 6 months of beginning of the symptoms (Table 3). Symptoms of MSCa have been reported to vary greatly and depend on location and extent of the tumour, its size, growth rate and presence or absence of metastasis. Common symptoms include nasal stuffiness/obstruction, pain, paraesthesia, fullness or swelling of the nose or cheek or a palatal bulge; a persistent or non-healing nasal sore or ulcer; nasal mass; or, in advanced cases, proptosis, diplopia, or lacrimation. 20,21

Risk factors reported for development of paranasal malignancies include chronic exposure to nickel, chlorophenols, wood dust (particularly to adenocarcinoma), textile dust, prior thorotrast instillation, smoking, etc. Though human papilloma virus has been proposed as a risk factor, a definite etiological role has not been clearly established. There is no well-defined precancerous lesion of the maxillary sinus as it is observed in other sites of the head and neck region. 4,9,23

The TNM staging is a useful parameter for management of the cases. It also helps to compare results & standardize disease status. In this study 42% patients had T4 and the remaining were T3 and T2. MSCas tend to be detected at T3/T4 stages, the presence of loco-regional metastasis is approximately 15% and around 10% among those presenting with metastatic focus during the first visit. Hence, MSCas have the lowest survival rates when compared to other similar tumours such as oral squamous cell carcinoma. Distant metastases are less common and range from 10% to 30% of cases at the initial presentation. <sup>5,8</sup> In this study no metastsasis was detected.

Computed tomography (CT) (Figure 3) and magnetic resonance imaging (MRI) are well-established and essential investigations for deciding surgical approach and radiation therapy as they provide valuable information about the size, margins, texture, extension, effect on bone and even the vascularity.<sup>24</sup>

Surgical resection generally is preferred as primary treatment with postoperative radiation for adverse parameters. It is most recommended regime for curative purposes. Palliative excision may be considered for patients with intractable pain to provide rapid decompression of vital structures, or to debulk a massive lesion, thus freeing the patient from social embarrassment. Early stage of maxillary sinus tumours can be removed via lateral rhinotomy and medial maxillectomy, inferior maxillectomy or wide local

excision. Larger tumours require partial resection, subtotal or total maxillectomy via midfacial degloving or Weber Ferguson incision.<sup>10</sup>

The most important prognostic factors in MSCas are: clinical stage, location of the tumour in the suprastructure or infrastructure, and whether or not the surgical margins are affected.<sup>21</sup> MSCas in the infrastructure have a better survival rate than those with tumours in the suprastructure.<sup>25</sup> Local recurrence in lesions to the infrastructure are lower due to improved access for adequate surgical resection. Surgical margins are difficult to ascertain in MSCa as it is practically impossible to carry out en bloc resection due to its extensive size.<sup>26</sup> MSCa prognosis is ominous and most patients die in two years' time and 5-year overall survival rate has remained unaltered inspite of progress in therapy for several decades in the range of 17% to 75%. 5,27 The histological type and grade has no influence on local control or  $survival.^{21} \\$ 

With this study it can be concluded that in Karaikal region benign tumours of maxilla outnumber the malignant ones. Inverted papilloma with squamous epithelial lining is the commonest benign tumour and sqamous cell carcinoma the commonest malignant tumour of maxilla. Both are more common in men than in women. Though benign tumours can present a few decades earlier than the malignant ones, both are most common in the 5<sup>th</sup> decade. Malignant tumours of maxillary sinus present to ENT surgeon in late stage. Although clinical manifestations of both benign and malignant lesions overlap, certain features like facial pain, cheek swelling, loosening of teeth which were found only in association with carcinoma should warrant thorough evaluation in suspected tumours of maxilla. Patients who do not respond to medical treatment for their sinonasal symptoms should be investigated for malignancies.

#### **ACKNOWLEDGMENTS**

Authors thank the department of radiology and pathology, Vinayaka Mission's Medical College, Karaikal for all the reports and cooperation during the study.

Funding: No funding sources Conflict of interest: None declared

Ethical approval: The study was approved by the

Institutional Ethics Committee

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Cite this article as: Kumar UM, Gouripur K, Elangovan S, Srinivasa V. Clinicopathological study of tumours of maxilla. Int J Otorhinolaryngol Head Neck Surg 2017;3:795-801.